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# Journal of the Society of Arts.

FRIDAY, AUGUST 17, 1866.

## Announcements by the Council.

### EXAMINATIONS, 1867.

The Programme of Examinations for 1867 is now published, and may be had *gratis* on application to the Secretary of the Society of Arts.

## Proceedings of Institutions.

OLDHAM LYCEUM.—The twenty-sixth annual report says that there are many reasons for congratulation; not that any great changes have taken place during the last year, nor any large accession made to the property of the institution; but all its departments have been efficiently sustained by the Sectional Committees, and its classes effectively taught by a staff of teachers competent for their work, and deeply interested in its success; and above all, that during a year of some local excitement, perfect harmony has been maintained in a constituency including men of various religious creeds and political opinions, who have held in abeyance their diversities, and zealously co-operated for the education and literary advancement of the population around them. During the past twelve months considerable repairs have been needful in the building, and some improvements have been made in the library and class rooms. The patent specification library is now arranged, and may be consulted, at given hours, by any resident of the town, on application to the secretary. A billiard club is being established by a number of gentlemen who will present to the institution a table and its appliances. The additions to the library have not been numerous, the most important of them being the gifts of the President. The average number of members during the year have been as follows:—Life members, 43; honorary, 197; annual, 236; half-yearly, 7; quarterly (male and female), 263; two months, 105; one month, 219; total 1,071. Finance:—The current income in 1864 was the largest ever realised, amounting to £581 11s. 10d. 1865 exhibits still further advance, the receipts being £618 18s. 5d.; to which must be added the sum of £30 received from the Science and Art Committee, as their proportion of working costs; making a total of £642 18s. 5d. against an expenditure of £635 12s. 9d., leaving a balance of £5 5s. 8d. in the treasurer's hands. For this satisfactory state of things the directors owe their obligations to the persevering energy of the secretary, Mr. Bailey. The reports of the teachers in the male classes are very favourable. With reference to the female classes, in which instruction is given in reading, writing, grammar, arithmetic, sewing, knitting, &c., the report says:—"These classes afford painful evidence of the extent to which the education of females is neglected, and the difficulty of promoting it so long as its importance is not felt. The teacher says:—"The attendance is generally irregular, seldom extending over more than two quarters; the progress also is slow, as many of the pupils have to be taught the first rudiments, and, disheartened by the drudgery of mastering these, they abandon the attempt, at a time when a little perseverance would make future attainments easy; there are some marked exceptions, and amongst them those who have acquired knowledge which will go far to fit them for the discharge of the obligations and duties of life." If the Class Committee could give

any healthy impulse to this department, they would confer no small benefit upon their town." The gymnasium has been opened, and is frequented by a number of subscribers, who greatly enjoy their exercises and derive much benefit from them. The total number of volumes in the library is 7,146, and the total issues during the year have been 23,383, or an average of nearly 75 vols. daily. The books most in demand are works of fiction, and treatises upon mechanical and physical science; the latter being costly, few of them will be found upon the shelves; this deficiency, however, the president (Mr. Platt, M.P.) has generously promised to supply by presenting an ample supply of the most approved scientific works now in circulation, and making constant accessions of new ones. The treasurer's account shows that the receipts for the year ending December 31st, 1865, amounted to £643 18s. 5d., and that there was a small balance in hand. With reference to the Science and Art Schools, it appears that those for instruction in machine drawing and mechanical philosophy have been steadily increasing in interest, and in 1864 the total number of students upon the roll was 60, which in 1866 increased to 95. The chemistry class has been suspended, in consequence of the continued indisposition of the teacher. So far as instruction has been given, most of the students have shown great interest in the subject, and have attended with commendable regularity. The free-hand drawing class has not been numerously attended, as many continued in it but a short time, using it simply as a preparation for the Mechanical Drawing Class, where prizes, which by some appear to be "more coveted than proficiency, are obtained more easily than in the Art Department." The treasurer's account for 1865 shows that the receipts were £127 3s. 7d., and that there is a small balance in hand.

### EXAMINATION PAPERS, 1866.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April last:—

(Continued from page 615).

## FRUIT AND VEGETABLE CULTURE.

### THREE HOURS ALLOWED.

#### I.—FRUIT-TREE CULTURE.

1. Give a list of 12 varieties of dessert apples to ripen in succession from August till May, and in the order in which they are ready for use.
2. The same of pears.
3. Give a list of eight varieties of kitchen apples to come into use in succession from August of one year till August of the year following.
4. Give a list of six varieties of dessert plums to ripen in succession from July till November, arranged in their order of ripening.
5. The same of cherries from May till September.
6. Name six varieties of the best peaches and state the order in which they ripen.
7. The same of nectarines.
8. The same of apricots.
9. What are the various stocks used for the propagation of the apple, and what is the effect each has on the scion?
10. What is the best form in which to train fruit trees for open fruit garden culture; and when ought the pruning of these trees to be performed so as most effectually to economise the vigour of the tree and develop the greatest amount of fruit-bearing wood?
11. What is the object for which root-pruning is practised, and at what season and in what manner is this operation to be performed?
12. Describe the process by which trees absorb moisture by their roots, and by which the sap circulates throughout their system.
13. Why are the upper shoots on a branch developed with greater vigour than the lower?

14. How is a branch increased in thickness?
15. How is a branch increased in length?
16. What are the functions of the leaves, and what is the influence that stimulates their operation?
17. Do trees absorb moisture by their roots and leaves only; and, if not, through what medium?
18. What are the substances that constitute the food of trees, and how are they conveyed and assimilated into their system?
19. What are the causes that induce canker and gum in fruit trees, and how are these causes to be removed or prevented?
20. Describe in detail, as concisely as possible, the forcing of vines for a crop to be ripe early in February, stating the period when the vines are started, the various degrees of temperature employed, and every operation practised in the course of the process.

## II.—VEGETABLE CULTURE.

21. Give a list of six varieties of peas to furnish a supply in succession from May till October, and state the periods when the seed of each should be sown.
22. Describe the cultivation of broccoli, stating the soil best adapted for it, and the mode of its preparation; also the varieties to be employed in securing a succession of supply throughout the year, beginning in August.
23. Describe in detail the process of making a hotbed.
24. Prepare a list of the kinds and quantities of vegetable seeds and roots necessary for cropping a garden of half an acre throughout the year.

## ANIMAL PHYSIOLOGY.

(IN RELATION TO HEALTH.)

THREE HOURS ALLOWED.

1. Describe the structure of the human lung, commencing at its root, and including the air tubes, air cells blood-vessels, lymphatics and nerves.
2. When, where, and how, is the gastric juice formed? Give an account of its composition and its action in the economy.
3. Enumerate the parts which serve as protective organs to the eyeball. Describe briefly their position and structure, and give the use of each.
4. Suppose a person to be suddenly immersed in carbonic acid gas, how and by what form of nervous and muscular action is suffocation produced? Name the parts which are concerned in the stoppage of the breath, and say how each acts.
5. What poison or poisons destroy human life in the case of exposure to the fumes of burning charcoal, or to the smoke of accidental fires in close rooms? What preliminary and other precautions can be taken to enable one to enter such apartments to save human life?

## DOMESTIC ECONOMY.

THREE HOURS ALLOWED.

### SECTION I.

1. Describe a convenient and economical dwelling for a working man and his family, say of four children.
2. What circumstances would influence you in the choice of a dwelling-house?
3. Give advice concerning the selection and purchase of household furniture.
4. What are the evils of the "tally" system?
5. What are the effects, moral and physical, of overcrowded dwellings in town and country? What remedies can you suggest for these evils?
6. Give an outline of the practical instruction which the mother of a well-regulated family, in which there are daughters intended for domestic service, may give to them in her own daily work.
7. What occupations of the labouring classes in our towns do you consider the least healthy, and why?
8. Explain what is meant by the words *cheap* and

*dear*, in purchasing articles of food and clothing, and in other domestic arrangements for a family.

9. What are the advantages of purchasing articles of daily use, such as coal, tea, sugar, &c., for ready money rather than on credit? State what you think is the cheapest and best mode of supplying a family with these necessary articles.

10. Describe the best dinner you could provide for four children, costing only one shilling.

11. Compare the advantages of linen, cotton, and woollen clothing, with regard to durability, health, and economy.

12. Give directions for washing woollen articles, and for getting up fine linen. Give reasons for the process you recommend.

13. Write a short essay on the most common habits injurious to health and strength.

14. How may hard water be rendered soft?

15. What are the advantages and disadvantages of an open fire-place? What precautions should be observed in the use of close stoves?

16. Why are baking and frying objectionable as a means of cooking meat? Give minute directions for boiling a leg of mutton, and your reasons for such directions.

17. In what respects does coffee differ from tea as an article of diet? Which is the most nourishing and wholesome, tea, coffee, or cocoa? Why?

18. Give clear and simple directions for the management of a sick room. What are the essential qualities of a good nurse?

19. What articles of food keep up animal warmth, supply the waste of muscle, and produce bone?

### SECTION II.

1. Describe the chemical action which goes on in the burning of a candle, and explain what takes place on blowing the fire with a pair of bellows.

2. Of what substances is flesh composed? Are they all equally valuable for purposes of nutrition? Why is beef less digestible than mutton, and the heart of an ox or sheep less so than the tongue?

3. Why is the potato valuable as an article of food, since it contains little nutritive matter? Why do we use salt with our food generally?

4. Why is bread made from wheat *meal* more nourishing and wholesome than that made from wheat flour? Compare oatmeal and wheat flour as articles of diet.

5. Hard water may safely be preserved in tanks lined with lead; soft water becomes poisonous under such circumstances. Why?

6. What are the chief articles of food in tropical, temperate, and Arctic climates respectively, and why? Can you account for the large consumption of alcohol in countries where moisture and cold accompany each other?

(To be continued.)

## THE NEW CHEMICAL LABORATORIES AT BONN AND BERLIN.

One of the appendices to the Thirteenth Report of the Department of Science and Art consists of a report by Professor Hofmann, on the laboratories now being built under his superintendence at Bonn and Berlin. This report was kindly drawn up by the Professor in compliance with the request of the Department, conveyed through her Majesty's Government to that of Prussia, and is interesting—not only for the information it contains, but also as showing the high estimation in which the advancement of chemical science is held in Germany.

Looking at the increased interest taken in chemical science in the present day, and its important bearing on the industries of Great Britain, it has been thought that an abstract of this report, so far as it refers to the laboratory at Bonn, will be acceptable to the members of the Society of Arts.

Dr. Hofmann, after remarking that of the six Prussian

universities, two—and these the most important ones—the Universities of Bonn and Berlin, had hitherto remained without chemical institutions in keeping with the advancement of science and corresponding to the demands of the present day; and after referring to the difficulties that stood in the way of the realisation of this great undertaking, expresses his belief that the foundation of the two great chemical institutions now being carried out under the auspices of the Prussian Minister of Public Instruction, has a significance far beyond the more immediate impetus they are sure to give to the prosecution of chemical studies in the universities to which they belong. By the grant of means unusually large for the organisation of these new schools, a tribute of recognition has been paid to the influence of chemistry on the modern aspect of the world that cannot remain without effect upon other departments of physical science which have not been less productive of useful results.

Side by side with the two new chemical schools now springing into existence, other institutions are sure to be founded, similar in nature and appointed with the same liberality, for the prosecution of the two other great branches of natural science, physics and physiology, to which, as well as to chemistry, the future belongs.

This subject is already being freely agitated in the Prussian universities, especially those of Bonn and Berlin. The leaders in the several branches of natural sciences are persuaded, that the great efforts at the present moment being made for chemistry will, sooner or later, benefit their own departments. It is not, however, in Prussia, or in Germany alone, that the wholesome influence of this example appears to be felt. The exertions of the Prussian Ministry of Public Instruction in the cause of chemical science have attracted the attention even of foreign governments. Inquiries respecting the new institutions have already been made by several other countries, more especially by England and France, and it is not unlikely that the noble precedent set by Prussia will soon be followed by the establishment of similar schools elsewhere. It is in this sense, at all events, that the writer ventures to interpret the desire expressed by Her Majesty's Government to obtain information on the subject of the two institutions in process of organization in the Universities of Bonn and Berlin, which, at the request of the Prussian Minister, he has endeavoured to supply by drawing up the following statement. He would, indeed, consider himself fortunate if this report, which, from the nature of the case, cannot be more than an outline, should assist in augmenting the interest already felt for the establishment of a great chemical institution in the metropolis of the world, an institution which England can no longer dispense with, since no country is more deeply interested than she is in the rapid diffusion of the latest results of chemical inquiry. The reporter proposes, in the first place, to give an account of the laboratories of the University of Bonn, which were earlier conceived and earlier begun, and are, consequently, in a far more advanced stage than those of the University of Berlin.

The first negotiations respecting the building of a new laboratory in Bonn go back as far as 1861. In the summer of that year the reporter was invited by his friends, Professor Plücker and Sell, to an interview with Mr. Beseler, the Curator of the University of Bonn. But little time elapsed before the first steps for the foundation of the new chemical school were taken. The negotiations already pending between the Minister of Public Instruction and the Curator of the University were soon concluded, and in the beginning of 1862 Mr. Beseler was commissioned by the Minister to inquire of the reporter whether he would undertake the organisation and direction of a chemical laboratory to be established in the University of Bonn, on a magnificent scale, and liberally provided with all the requirements for modern investigation. The question thus opened led to

a series of negotiations which ended, in the spring of 1863, in the reporter complying with this proposal.

The important duty of drawing out the plans of the new institution devolved on Mr. Augustus Dieckhoff, architect to the University, and in preparing the programme, the composition of which fell to the lot of the reporter, it appeared all-important to gather information as exact as possible respecting the chemical institutions already in existence, and the reporter was fortunate enough to obtain drawings and plans of nearly every existing laboratory. The chief experience, however, was gathered during a journey of several months through Germany, in the autumn of 1863. On this trip nearly all the German laboratories were studied, from that of Giessen, the first German university laboratory, which the father of the reporter built more than a quarter of a century ago for Liebig, down to the more recently-founded chemical schools in Karlsruhe, Munich, Zurich, Heidelberg, and Göttingen, and the splendid institution just completed in the University of Greifswald.

Ultimately a plan, the detailed contract for which amounted to 183,000 thalers (£18,450), passed, with scarcely an alteration, the several stages of supervision, and was sanctioned by Government.

The first turf was turned late in the autumn of 1864; the spring of 1865 saw the foundation stone laid; and the building, the construction of which was entrusted to an able young architect, Mr. Jacob Neumann, who had already efficiently assisted in laying out the plans, is at present being roofed in, so that in the summer of 1867 it can be handed over to the university.

The new chemical institution is provisionally intended for 60 students; the space, however, has been meted out so liberally, that accommodation could be supplied without inconvenience to a much greater number; besides this, the building has been so constructed as to allow of enlargement at any future time, by raising a second story, without detracting from the harmony of its structure.

In addition to the various apartments required for educational purposes, for practical analysis, for scientific and technical investigations, and, lastly, for the lectures, there are in the new building sets of rooms for the castellan of the institution, for the *famulus* and servants, apartments for three assistants, and also a magnificent residence for the director, consisting of a suite of rooms which, as regards number and extent, could be very seldom met with in a private house. Lastly, there is a considerable number of well-lighted basement rooms, which have as yet no special use assigned to them, but the construction of which could not be avoided.

The various departments of the building are spread over three floors, the basement, the ground floor, and the first floor. The first floor, however, extends over but a small portion of the structure, and is exclusively occupied by the private apartments of the director. But few of the rooms devoted to the purposes of the institution are found in the basement, as, for instance, the store-rooms, the rooms for metallurgical and other operations requiring large quantities of fuel, those for medico-legal and chemico-physiological research, &c. All the remaining space intended for educational purposes, viz., the laboratories, with their adjoining rooms for special operations, and side-rooms, balance-rooms, rooms for volumetric analysis, combustion-rooms, lecture-theatres, the hall for collections, the study and private laboratory of the director, the apartments of the assistants and other officers of the institution, are, one and all, on the ground floor, an advantage which would not have been obtained had the site of the building been of more limited dimensions.

As the ground floor had to contain no less than 44 rooms, exclusive of vestibule, corridors, and closets, its dimensions necessarily became very considerable. Four outer wings enclose an area of very considerable size, divided into four quadrangles or courts by a cruciform interior building. Those parts of the edifice surrounding the two back courts are exclusively devoted to the pur-

poses of practical instruction in chemical analysis and research. The wing of the central structure which separates the two front courts from each other includes the lecture theatre, with the rooms pertaining thereto; in the south-west side wing of the left front court is the private laboratory of the director, with the rest of the rooms devoted to his use. The corresponding north-east side wing of the right front court is occupied by the apartments of the assistants and other officers. The ground floor of the front part of the building, lastly, is devoted to the scientific collections of the institution and a small theatre for special lectures.

The main entrance for students, as well for those working in the laboratory as for those who only attend the lectures, lies in the principal side-front facing the city of Bonn.

After ascending the stairs we enter a large vestibule richly decorated. Before the spectator stretches a long corridor of considerable width, the main artery of the entire building, brilliantly lighted by a number of windows on the left side. The large folding doors at the further end of the corridor, visible from and directly opposite to the main entrance, lead to the director's spacious study, which is provided with a large bow-window for microscopic observations; from this central situation the various parts of the great building are quickly and easily accessible. On the right-side the great corridor branches out into three side-corridors leading to the entrances of the three principal laboratories, each lighted by ten windows, symmetrically arranged on the two sides, and providing 20 students with more than sufficient space and every convenience for work.

Permanent working-places for 60 students, which, as already mentioned, the institution is to accommodate, were thus secured. According to this disposal of the space, the students range themselves in three classes:—  
1. Beginners, that is to say, those who having become acquainted with the rudiments of chemistry by attending lectures, enter the laboratory to become exercised in chemical manipulation, to make preparations, and to go through an elementary course of qualitative analysis.  
2. Advanced students, or those who, having acquired practice in qualitative experiments, are occupied with quantitative analysis, both ponderal and volumetric.  
3. Young chemists, sufficiently conversant with the principal department of chemistry to engage in the original experimental investigations, either suggested by the director or chosen by themselves.

A division of this nature, whereby the three classes are distributed in separate rooms, seemed expedient for more than one reason. Not only was it possible to fit up each laboratory in a manner suitable to the wants of each particular class, but the situation of the rooms themselves could be so adapted to the remaining parts of the building as to offer the greatest facilities to each division. And higher still must be rated the advantages as regards readier supervision and increased means of maintaining discipline in all parts of the institution afforded by an arrangement of this kind.

The good arising from a large number of students working together in an extensive institution is unmistakable. If the student have but his eyes open to the work of his neighbours he has opportunities of gaining, in a comparatively short time, an amount of experience which, working alone or in company with only a few, he could scarcely gather during years of diligent labour. It is the chemical atmosphere in which he works that promotes his progress.

These advantages, on the other hand, cease when the number of learners exceeds those limits within which personal supervision is still possible. As soon as the beginner is no longer conscious that he is able to procure help at any moment—as soon as the more advanced student no longer feels that he receives individual attention—lastly, as soon as the young chemist, though working independently, is no longer satisfied that an

experienced eye watches over his steps—the chemical institution, however excellently it may be organised in other respects, will yield very small results indeed. It is, therefore, of the first importance for the director of such an institution to have the necessary teaching power by his side. According to the reporter's experience it is not possible for an assistant to superintend, for any length of time and with satisfactory results, the labours of more than twenty students. Acting upon this experience, the Minister of Public Instruction decided to appoint for the institution of Bonn three scientific assistants, who, under the guidance of the director, are to watch over the experimental studies of the students. The disposal of the students in three separate laboratories seemed to accord particularly well with this provision.

In these three laboratories the students have their permanent working places. To each, one is allotted, for this purpose, a table amply supplied with gas and water, as well as lock-up drawers and cupboards in which to keep apparatus, re-agents, &c. At these working benches all ordinary chemical work and all operations, not requiring the special arrangements provided in other parts of the institution, are carried on.

Turning now our attention to the side apartments attached to the three laboratories, we have, in the first place, to mention three closets in direct communication with the main rooms. They are in charge of the respective assistants, and are intended for preserving delicate and costly apparatus, platinum and silver vessels, expensive re-agents—everything, in fact, of which special care has to be taken.

There are certain operations which cannot be well conducted in the three laboratories referred to. On this account they are connected with a series of rooms devoted to special purposes. There are three rooms, directly communicating with the laboratories, called "operation rooms;" and here all kinds of work, such as distillations, making of gases, heating of bodies in particular gas atmospheres—in short, all experiments requiring large and complicated apparatus, are conducted at the benches fitted up in these rooms or in the "evaporation niches" let into the walls. In case, however, on any particular occasion, even more space should be required, each operation room communicates with a covered colonnade, opening towards a back court, and fitted up with gas and water and all the requisites for work. From these colonnades the basement of the building, containing a variety of rooms devoted to the objects of the institution, and more especially the metallurgical laboratories, is accessible by means of spiral staircases placed in spacious semi-circular projections from the outer walls. Flights of steps on the other hand, lead from the open sides of the colonnades down to two back courts lying between the three laboratories, and here the student finds an additional supply of water in large central reservoirs, the tabular parapets of which serve as working benches for a variety of operations.

The three operation rooms, situated behind their respective laboratories, are not of equal dimensions. In apportioning their size especial attention had to be paid to the wants of the beginner and of the independent worker. The beginner who practises the various forms of chemical manipulation, preparing gases, making chemical preparations of all kinds, &c., requires ample space in which to develop his activity. In like manner the young chemist engaged in actual research may at any moment want to fit up new or reconstruct old apparatus, often of a complicated nature, for the particular objects of his investigation; tools of the most various description, hammers, files, vices, &c., are thus constantly required, not to mention the blowpipe-table scarcely ever at rest. For him too it is of vital importance that he should not be cramped in space. For this reason the operation rooms connected with the two wing laboratories, and expressly intended for the classes just mentioned, are made as large as possible. The students

of the second laboratory, principally occupied with quantitative analysis, have therefore had a less spacious operation room allotted to them. By this arrangement an additional small apartment was gained, symmetrical with this operation room, and serving as an approach to a very important part of the institution, viz., the laboratory for gas analysis. This spacious apartment projects from the middle of the building at the back, and is thus almost equally accessible from the three laboratories; it is on the other hand sufficiently removed, more especially by the intervening ante-room, from those parts of the building where the chemical business of the institution is most active, to allow of the delicate measurements here made being carried out without disturbance. It is lighted by two large side windows and also by three smaller windows situated in a central projection; but all the light coming from the south can be shut out by means of strong well closing shutters, thus securing to this apartment the uniform temperature so important in gas analysis.

Along the main corridor lies a series of rooms opening upon it, and lighted by windows looking into the back courts of the institution. Close to the vestibule, immediately to the right and lying between the entrance to the first and second laboratories, is, first of all, the volumetric analysis room, where are kept the standard solutions, daily increasing in variety, as well as the graduated vessels.

The balance room, the next in order, is not only intended for the reception of chemical balances, but also of the more delicate physical instruments made use of in analysis, such as air-pumps, barometers, &c.

Next follows a room for fusions and ignitions, capable of being carried out by means of gas. Here are the necessary appliances for the various heating operations occurring in mineral analysis. This room is also fitted up with all the requirements for organic analysis (carbon and nitrogen determination), likewise exclusively conducted by means of gas, and carried on in special "combustion niches" let into the walls, and communicating directly with the outer air by means of wide tubes of glazed earthenware. This room also contains the ranges of water ovens required for drying the substances to be submitted to analysis. In these ovens, which are heated by the steam of the stills for distilled water in the basement, every student has his own compartment under lock and key. With respect to the uses of these three rooms, they are more especially intended for the workers in the middle laboratory; they are, however, accessible also to the beginners. The balance-room is purposely situated in the middle, and separated from the laboratories by the volumetric analysis room on the one side, and the room for fusions and ignitions on the other, so as to protect as effectually as possible the costly instruments of this room from the fumes which, in spite of all ventilation, at times escape in a laboratory. The situation of the balance-room, between the two others, affords an additional and a by no means trifling advantage; numerous operations preceding the weighings, such as drying substances in the water bath, heating crucibles, collecting the combustion products in organic analysis, &c., all take place in the immediate neighbourhood of the balance, whilst on the other hand the preliminary weighings, invariably forming the first step in volumetric analysis, can be made in close proximity to the room devoted to the subsequent stages of volumetric observation. The three rooms therefore communicate directly with each other.

Between the second and third laboratories are, in addition to a small flight of steps leading to a number of attics over the ground floor, three precisely similar rooms, accessible from the corridor, and with doors opening into each other. Of these, the one nearest the second laboratory is intended for the library.

The main results of chemical investigation are duly registered in treatises and manuals, and are therefore easily within the reach of students. But the statements

to be found in books of this description cannot be more than abstracts, always very considerably condensed, and often more or less garbled, from the memoirs of the first observers. As soon, therefore, as the student has got beyond the first rudiments he can no longer dispense with original sources of information. The main bulk of chemical observation is collected in a series of periodicals and journals, the volumes of which are counted by hundreds, and if all were collected certainly by thousands. Again, many important investigations have been communicated by their authors to the various academies and learned corporations, and are printed in the transactions of these societies. Thus it happens that the literature of chemistry, though the youngest of sciences, has already attained to very considerable dimensions; and to collect the works which have to be consulted in the prosecution of even limited investigations in most cases far exceeds the power of any single individual. These books could of course be readily procured from any public library, but reference to original communications is but too frequently omitted if the work is only to be had by specially sending for it. On this account every chemical school possesses a library, more or less complete, offering to the student a copious collection of original memoirs, which he can consult at the very moment he may require their assistance. The use, it may be said the necessity, of such libraries is so apparent that students themselves have in a great many instances most materially participated in their foundation and subsequent development. In this way, from but small beginnings, some most complete collections of chemical works have been formed. The reporter, when a young student, had the good fortune to take part in the establishment of such a laboratory collection, under the auspices of his illustrious master, Baron Liebig, at Giessen; this is now the oldest and probably the largest chemical library extant. In later times he had the pleasure of assisting in the inauguration of a similar collection for the Royal College of Chemistry in London. Such a library it is of course in contemplation to establish for the Bonn laboratory, and already, long before its opening, a number of books have come in as presents. The situation of the room set apart for their reception, between the second and third laboratories, is peculiarly appropriate, because it is more especially to the students of these two laboratories that the library will be of use, whilst its slight distance from that part of the institution where the director carries on his own researches is likewise a great convenience to him and his assistants.

The two remaining rooms lying between the second and third laboratories are a balance room and a room for fusions and ignitions. With these rooms, on the right-hand side of the principal corridor, terminate the ground-floor apartments intended for practical instruction. We have now only to glance at the theatre and adjoining rooms for preparing the lectures and preserving apparatus, models, drawings, and collections of all kinds.

The students attending chemical lectures in the German universities are always much more numerous than those who work in the laboratories, and, therefore, more accommodation had to be provided in the lecture hall.\* A lecture room capable of holding 250 students appeared to meet the requirements of the University of Bonn. An area of 40 feet square was found sufficient for this purpose, and at the same time to afford ample space for the lecture table, as well as for the free movement of the lecturer and his assistants.

In the great lecture hall, the seats are arranged like the tiers of an amphitheatre, and in the lower part, just opposite the entrance, is placed the lecture table, 40 feet long and 3 feet 4 inches wide. In the lower part of the wall, behind the table, are the evaporation and ventilation niches for experiments,

\* During the winter session of 1865-66 the University of Bonn was attended by 818 matriculated and 35 non-matriculated students: total number of students, 853.

whilst on its upper part drawings and diagrams can be exhibited. The lecture room is lighted from both sides, so that neither professor nor audience is obliged to face the light, an advantage sure to be appreciated by any one who has been either lecturer or hearer in a room of different construction. The fourteen windows which supply light on either side are arranged at a height of nine feet above the floor of the hall, except the two next the lecturer, which descend to the level of the table, enabling him to exhibit many colour-phenomena by means of transmitted light, and to employ sun-light, under favourable conditions, as an agent in his experimental illustrations.

The theatre communicates with the laboratory of the lecture assistant by means of two side doors, and a large niche in the centre of the wall. Here everything required for the lecturer is got in readiness, and for this purpose all the necessary furnaces and benches are provided. In this room larger pieces of apparatus can be fitted up upon a table moving on rails, which can be run through the niche already mentioned in the theatre during the course of the lecture. This laboratory is lighted from two sides, on the north-east by a large window, and on the south-west by a glass door communicating with a platform; whence a staircase leads down to the front court. These steps also communicate with the rooms of the basement underneath, for the storage of compounds requiring a low temperature, sealed tubes containing condensed gases, &c., and likewise give access to a well-ventilated closet immediately under the lecture-table, containing a large galvanic battery, the wires of which pass through the ceiling into the theatre above. The room where the experiments for the lectures are prepared is of course in close connexion with the store-room for apparatus, models, drawings, and diagrams; this room likewise is lighted from both sides. Further on we come to the last room of this series, having but one window, which is used for the preservation of the various documents belonging to the lectures, such as printed forms, registered lists of students attending, &c., and where the professor may stay before entering the theatre, and receive those students after the lecture who wish to consult him. This room, called the lecturers' waiting-room, communicates with the mineralogical museum, one of the great halls assigned to the scientific collections of the institution. This hall, as well as the one next to it, which being profusely lighted by six windows symmetrically disposed on both sides, is intended for the chemical museum, is in the front block of the building. Close to the mineralogical museum is a small lecture room for recapitulations and special lectures to be conducted by the assistants.

All the rooms for apparatus, chemical preparations, &c., used in the lectures are situated between the two rooms devoted to oral demonstrations, so that all requisites for the lectures can be conveyed with the greatest ease either to the larger or the smaller theatre, and back to the collections. It was not without intention that the museums were somewhat removed from the busier departments of the institution. The experience of the reporter, which is not unlikely to receive confirmation from others, has taught him that the love of research and zeal for discovery in young chemists, however praiseworthy in itself, is at times anything but conducive to the increase of scientific collections.

The large halls for the mineralogical and chemical collections, together with the smaller theatre and its preparation room, occupy almost the entire ground floor of the front block of the building. In addition to these are still to be mentioned two vestibules, leading the one to the main staircase, the other to the back staircase ascending to the apartments on the first floor; then immediately to the left of the north-east entrance a lodge for the house porter; and, lastly, close to the south-west entrance, apartments for one of the junior assistants of the Institution.

Of the two sideways, the one stretching out at right

angles from the left of the main vestibule in the north-east front contains the porter's lodge and other apartments, while the other side wing is entirely devoted to the scientific purposes of the director, with whose study this part of the building is in immediate communication. Of the rooms situated in this wing mention must first be made of the private laboratory of the director, which is lighted by four windows. On one side of this lies the director's waiting room, accessible from the main corridor, and communicating with his study by a short private passage. Beyond the other end of the private laboratory are two small apartments, one to be used as a balance-room, the other as a room for ignition, fusions, and combustions. The latter has egress to a little portico for experiments required to be performed in the open air.

The basement is, to all intents and purposes, a repetition of the ground-floor, the greater thickness of the walls, however, lessening the amount of space to some extent. The rooms in this part of the building are 12 feet in height from the floor to the top of the arch, and are sufficiently lighted throughout, by numerous windows of comparatively large dimensions.

Along the main corridor of the basement are two spacious rooms, of which the first is intended for the storage of solid, the other for that of liquid re-agents. Both store-rooms are close to the flight of stairs leading on one side into the courts, on the other to the ground-floor, whereby the carriage of chemicals to the store-rooms, and thence to the main body of the institution is greatly facilitated. The same accessibility to the floor above pertains to the other two rooms along this corridor, and has determined their especial uses. In the one nearest to the staircase a steam boiler will be set up; while directly communicating with the steam boiler room, and at the same time accessible from the corridor, is a large and well lighted apartment intended for rougher kinds of work, and especially for a general wash-room, where apparatus of all kinds can be readily cleaned. For all these purposes the close proximity of the steam boiler is an especial advantage. In this room, moreover, a large press will be fitted up, in the use of which for hot pressing purposes the steam, close at hand, may likewise be turned to account. At the extreme end of the corridor is a fine well-lighted room, corresponding in form and size with the director's study on the floor above; this is a store-room for the large stock of glass and porcelain, under the charge of the castellan.

The two rooms next in succession are provided for chemico-physiological researches; the large well-lighted room at the end being the laboratory for physiological chemistry, whilst the adjoining room is fitted up as a stable for the housing and feeding of animals required for the investigations.

In addition to this laboratory, the basement of the back block of the building contains two furnace rooms for smelting operations, carried on by means of coal and coke. The larger of these, that situated in the middle, is for students of the second and third laboratories; while the smaller one is for the beginners. These laboratories are purposely located in the basement, the greater height of the chimneys of this flat ensuring a considerable increase of draught. They are, moreover, far less frequently used than the rooms on the ground floor. Lastly, the dust and dirt invariably attending the use of coal is thus almost entirely excluded from the flat above. The furnaces and appliances set up in these laboratories are of a varied nature; among them specially protected niches for operations carried on under great pressure, such as digestion of substances in sealed tubes, &c., deserve particular attention.

For the storage of the fuel required for the furnace-rooms, four coal cellars have been provided.

With regard to the courts themselves, it deserves to be mentioned that the two front courts communicate by means of a thoroughfare cutting the front wing of the cross building immediately under the landing of the

theatre staircase; in this manner any one of the four courts can be reached through the carriage-way facing the town, without entering the interior of the building. Such a disposition is of great use for the preservation of cleanliness throughout, and of absolute necessity in order to render all parts of the building accessible in case of fire.

Attention must still be directed to some of the rooms situated on the basement of the front part of the middle wing.

On descending from the ground floor to the basement, we pass through the vestibule into a large workshop lighted by three windows. Here the rougher work required for the lectures is performed; here liquid carbonic acid would be prepared, and here, in a well-ventilated niche, stands the large galvanic battery already mentioned, the wires of which, passing through the floor of the theatre above, communicate with the electric lamp, now rapidly becoming an indispensable appliance of the lecture-table. Further on is a small laboratory for medico-legal investigations; it is lighted from both sides, and being accessible only to the director and the lecture-assistant, is effectually protected from all undesirable intrusion. Beside the room for the rougher lecture work there is a small cellar communicating with the vestibule, in which compounds requiring a low temperature, explosive bodies, such as gases condensed in hermetically-sealed tubes, like sulphurous acid, chlorine, &c., are preserved. Substances readily undergoing decomposition, generating corrosive vapours, or in any way dangerous, can thus be conveniently excluded from the general collection.

The external aspect of the new laboratories is in perfect keeping with the scale of grandeur of the ground plan. The street front is 180 feet in length; the side-front, with the main entrance for students, has a depth of 250 feet.

Only the front block of the building has a second story; this contains a most splendid suite of apartments provided for the director of the institution. This residence is richly ornamented, and will in all respects be worthy of the institution to which it belongs. The reporter "must not enter into details upon this subject, but he cannot leave unnoticed the imposing entrance hall, illuminated by a glass cupola above, and the splendid ball-room, extending through two stories, amply satisfying the social requirements of a chemical professor of the second half of the nineteenth century."

#### PARIS EXHIBITION OF 1867.—HEATING AND LIGHTING.

The following communication has been sent by Mr. E. Chadwick, C.B., to the Committee which has been appointed to consider this subject:—

SIR,—In the course of my service I have had to take part in the preparation of measures for the prevention of the smoke nuisance chiefly in respect to the large furnaces of manufactures. The subjects, however, involved also the important question of economy of fuel, which has in many instances been considerable. It is unnecessary to enlarge upon the importance of that topic to all countries. Very considerable economies have been achieved in respect to large furnaces by compulsory measures, but it would be an important result of the proposed International Commission to ascertain, upon well-considered trials, and make known authentically, for voluntary adoption, the best means of economising fuel. Our Army Sanitary Commission, about seven years ago, directed competitive examinations to be made of the heating powers of boilers, as also of different forms of cooking-ranges. As to boilers, the result of these competitions was a gain of full one-half, namely, that 1lb. of coal in one form effected as much as 2lb. in another; and in respect to cooking-ranges, the difference of result reported was as much as from 64oz. to 2½ oz. of coal per head of men cooked for.

Probably by this time these means might advantageously be re-examined, even for England. But these trials related to the larger army cooking-apparatus. What I beg you to submit to the consideration of the Commissioners is, that instead of an exhibition of mere iron or metallic forms, put forth sometimes with common and little-headed traders' pretensions, which have not been tested with any degree of accuracy even by themselves, the Exhibition spaces allotted should be competed for by authentic and well-considered trials, and that these trials should be carefully extended to three classes at least of domestic appliances; 1st, those for the cottage, to cook and at the same time warm the dwelling-rooms and heat irons; 2nd, the grates for warming dwelling-rooms of larger houses; 3rd, the larger cooking-ranges of every kind for hotels and mansions, to roast, bake, boil, stew. I need not go into the details of these trials—they would be for subsequent consideration. The heating powers of grates might be tested in given spaces and trials with different sorts of coal. Perhaps the convenience of inventors or manufacturers would be tested, and the trials themselves advanced by having arrangements made for conducting them in England and in France at the same time. Probably the foremost means might be retested upon some agreed plan in Paris. As far as my own information goes, the greatest and most successful achievements in cooking power have been made in France to an extent of two, even three, to one as against the kitchen cooking appliances in England. It would be of use to the French manufacturers, perhaps, that their success should be tried in England. What would be required would be provision of rooms and scientific attendance. Some manufacturers might be willing to pay for the expenses of the trials, but I should submit that this is a very inferior matter for consideration. Each might be allowed to attend by themselves or others to witness the conduct of the trials.

Speaking of England alone, there can be no doubt that in the domestic ranges a saving of one-half the fuel is attainable by improved construction.

I ascertained that the washing-bill for London could not be less than five millions per annum, and that one-half of this, probably, would be saved by economising smoke.

I asked my friend Mr. Twining to submit the suggestion of competitive trials on this subject to M. le Commissaire-Générale of the Exhibition, and through Mr. Twining I have received a letter in which M. Le Play states:—

"J'ai examiné avec un vif intérêt ces observations, et je m'empresse de vous indiquer la voie qui me paraîtrait la plus sûre pour réaliser la pensée de M. Chadwick. Il conviendrait qu'il voulût bien se concerter le plus prochainement possible avec quelques représentants éminents de la science en Angleterre, en France, et en d'autres pays. Une fois le concours de ces notabilités assuré, un programme soumis à leur adhésion et déterminait, le plan des travaux devrait m'être aussitôt adressé. Je m'empresserais de le soumettre à la Commission Impériale, et je me plais à espérer qu'elle jugerait possible de choisir les personnes adhérentes au projets de Monsieur Chadwick en qualité de membres d'une section spéciale de la Commission Scientifique, instituée aux termes de l'arrêté du vingt Septembre dont j'ai l'honneur de vous adresser ci-inclus un exemplaire, pour concourir à la vulgarisation des inventions utiles."

I am, &c., EDWIN CHADWICK.

To Henry Cole, Esq., C.B.

#### NATIONAL MUSICAL EDUCATION.

The following article, having especial reference to the proceedings of the Musical Education Committee, is from the *Morning Star* of Friday, the 10th inst:—

However little we may be disposed to agree in matters

political with Mr. Matthew Arnold's glorification of continental "geist," we are compelled to coincide in his condemnation of the wretched condition of the fine arts in this country, as compared with France, Italy, or Germany. In æsthetic education individualism does not indeed seem qualified for success. We do not believe that in artistic capacity Englishmen are one whit inferior to Frenchmen or Germans; the reason, therefore, that the former make so poor a show beside the latter in many artistic pursuits we can only look for in the entire absence in this country of any public organisation for training the high natural powers which now run wild and waste. In France, in Germany, in Italy, the State undertakes systematically the artistic education of a limited number of the most gifted youth of both sexes. Hence there is never a deficiency of skilled teachers of music and the plastic arts in those countries; whereas in England, though we have some great artists, they are accidents, and we cannot in the present state of things, without an intelligent teaching body, expect any general diffusion of the principles of sound art throughout the country. This want is felt more especially in music, for our cathedrals and churches of all denominations require a constant supply of trained musicians, while the growing taste for music among all classes, ill-regulated as it unhappily has hitherto been, attracts an increasing number of teachers. The absence of some central body to guide the public taste in musical matters, and to train professors of the art, is becoming more and more a subject of complaint. The Society of Arts has recently taken the matter in hand. A committee was appointed for the purpose of inquiring into the present condition of musical education in England, and comparing it with the continental system. The Prince of Wales was chairman, and several gentlemen, well-known for their interest in questions of art, took a part in the investigation. The committee's report has just been published, and is a very interesting and instructive document. It contains very copious details respecting the constitution and working of the various institutions for musical training, for the most part originated and supported by private persons, at present existing in this country. These are the Royal Academy of Music, the National Colleges of Music, the London Academy of Music, the London Vocal Academy, and the Military School of Music. Reports are subjoined of the state and success of the musical institutions of Paris, Munich, Vienna, Prague, Leipsic, Berlin, Milan, Naples, Brussels, and Liège. The evidence of the chief professors, composers, and performers, as well as of some critics and gentlemen who have studied the question, is given at length; so that it will be seen ample materials have been provided to enable the public to form a judgment as to the expediency of the State interfering in the matter.

The report itself is very brief, and merely gives an outline of the plan which the committee would desire to see adopted. The Royal Academy of Music, which is organised under Royal charter, and receives £500 per annum from the State, would be the natural centre of a new system. The committee would look for a considerable Parliamentary grant, under the control of the executive, as the first requisite for organising afresh the musical education of the country. In this way gratuitous instruction, on the French plan, might be given to persons of great natural powers, who would engage to devote themselves to the public service as musical teachers, and who, after their education had been completed, would for some time receive support by means of scholarships given away by competitive examination. The institution would also be open, on payment of moderate fees, to the general public. The present premises of the Royal Academy of Music being unfit for their purpose, the Committee propose that a site should be obtained from the Crown, and buildings be erected by funds raised by subscription. It is believed, of course, that were these suggestions adopted, the lovers of music in England would come forward most liberally to assist in

providing a proper asylum for the new Academy. The present state of music in England is enough to show how urgent some step in advance is needed. If we glance over the names of the celebrated composers, singers, and performers of the day, we see many French, German, and Italian names for every English name; and this but faintly represents the immense defect of trained teachers and performers which is to be found in the lower ranks of the musical profession. We cannot go into the details of the foreign institutions which are given in the report, but one or two instances will be enough to show that to account for the inferiority of England in musical skill we need not assume that she is inferior in musical taste or power. Our entire State contribution to musical teaching is, be it remembered, £500 a-year. In France the Government maintains the Conservatoire at Paris at a cost of nearly £8,000 per annum, besides giving subventions to various provincial places of instruction. Throughout Germany the musical academies, which are all well endowed, receive likewise State assistance to a large extent. In Italy the three academies of Naples, Milan, and Florence receive in various proportions an annual grant from the State of more than £11,000.

The report is well worthy of public attention. It may be asked, what good result could the community in general expect from an increased expenditure, legislative or voluntary, in this direction? We cannot look, to be sure, for any material or immediate advantages; but surely there can be few who will refuse to acknowledge that as you raise the taste of a nation, you withdraw them from debasing vices, and elevate them in the moral scale. England, moreover, has of late been so absorbed in the struggle for commercial and manufacturing supremacy that she has neglected and lost her old fame as a land of music. Perhaps we can hardly go so far as to indorse the somewhat imaginative declaration of Mr. Chester that "Merry England was musical England;" but we share with him the hope that the efforts of the Society of Arts may help us to make England musical again. We are not in general votaries of State subvention or State action where private and voluntary organisation can possibly be made available. But we seem to be exactly in the same position with regard to music that we are with regard to literature. The State gives just enough to affirm the principle of State patronage; not enough to be of the slightest practical service. By giving nothing we should, at all events, save a trifle; by giving something substantial we should, at least, accomplish a result; at present we sanction the vice of the worst kind of patronage without achieving any of the good purposes which a wise and practical patronage generally secures.

#### CONSERVATOIRE OF MUSIC.—PARIS.

The annual competitions finished on the 28th of July, with the classes of wind instruments, in which the competitors are always numerous, and whatever may be the general opinion respecting the instruction of the Conservatoire in other branches of music, it is unanimously admitted that as regards wind instruments it produces a large number of excellent performers. During this portion of the competitive examinations there is no fashionable public in the theatre, which is half filled with military musicians, for whom this portion of the competition has a special interest. The juries for these divisions consisted of MM. Kastner, Bazin, Benoist, Collin, Dauverné, Jonas, Meifred, Renaud de Vilbac, and Cokken, all eminent composers, professors, or instrumentalists, with M. Auber as President.

FLUTE.—Eight competitors, all pupils of M. Dorus, professor in the Conservatoire. The *morceaux* selected for the competition were fragments of the fourth concerto of Tulon. The prizes awarded were one of the first class, one of the second, divided between two competitors; and first, second, and third accessits.

HAUTBOIS.—Seven competitors, pupils of M. Triebert,

Selection from the concerto of Vogt. The first prize was awarded to M. Delaby, a blind pupil; the second was divided between two competitors. A first accessit was also awarded between two pupils, one being blind.

**CLARINET.**—Seven candidates, pupils of M. Klosé. Piece, the eleventh solo of Klosé. There were awarded a first and second prize and a first accessit.

**BASSOON.**—There were only four competitors in this class, of which M. Cokken is the professor, but they exhibited unusual proficiency, and called forth enthusiastic applause. The piece selected was the first *morceau* of the concerto of Weber. Awards: a first and second prize, and a first and third accessit.

**HORN.**—The playing in this class was also remarkably good. Four competitors, pupils of M. Morh, a solo by the professor being selected for the competition.

**TRUMPET.**—Eight competitors, pupils of M. Dauverné. Piece selected, the third solo of the professor. Awards: first prize, and second prize divided.

**TROMBONE.**—Three competitors, pupils of M. Dieppo. Piece, a solo by M. Bazin. Awards: first and second prizes, and first accessit.

The results of the competitions in the classes of military pupils attached to the Conservatoire was as follows:—

**TROMBONE A PISTON.**—Four competitors. Awards: A second prize and three accessits.

**CORNET A PISTON.**—Six competitors, pupils of M. Forestier, whose sixth solo was selected for performance. Awarded: first and second prizes, and three accessits.

THE SAXOPHONE AND SAXHORN are favourite instruments in Paris, and the competition in each case was brilliant. In the former class there were granted one first and three second prizes; and three first, three second, and four third class accessits. M. Sax is professor of this class. The number of competitors in this case is not given.

**SAXHORN.**—Five competitors, who performed a fantasia from "La Muette," by M. Arban, the professor. Awards: one first and three second prizes, and a first accessit, all the candidates being rewarded.

The particulars of the competition in the violin and violoncello classes are not given.

The total number of awards made this year was 263, namely, 33 first prizes, 2 second, first, and 46 second prizes; 30 first class medals, 39 first accessits, 36 second class medals, 33 second accessits, 24 third class medals, and 30 third accessits. Three of the successful competitors were pupils of the Imperial Institution for the Blind.

The concours of the Conservatoire leave no doubt about the quantity of musical talent fostered and ripened in its classes; but the general opinion respecting the quality of the instruction and the results obtained is not so satisfactory. It is admitted almost on all hands that the results, as far as regards the mechanism of the art, are nearly always good; but it is almost as generally maintained that there is very much yet to be done, or undone, with regard to the higher branches of the art. The acquirements of the Conservatoire pupils in general are declared to stand in the inverse ratio of the perfection of the instrument employed. The performances on the horn, trombone, trumpet, and other instruments of like importance are universally applauded, while those of the violin and singing classes are as universally cited as sadly wanting in the higher elements of the art, and public opinion seems to accept the critical complaint as, at any rate, not quite without foundation. Many persons declare that the Conservatoire requires entirely remodelling; not that the professors are unskilful, but that the system has fallen into the groove of routine, that the pupils are primed to the performance of certain *morceaux*, according to accepted methods and traditions, but not trained to think for themselves or led to the study of the principles of their art. It is the universal complaint against almost all popular establishments, and unfortunately to a certain extent as irremediable as it is well founded. It is the fault inherent in all attempts to force talent wholesale and at small cost; it is the bane of many of the best-

intentioned efforts towards artistic education on the continent; the grand error of supposing that any system of mere teaching can supply the place of true training, fitting to the individual character and abilities of each pupil.

There are always more than six hundred pupils in the Conservatoire, and the supporters of the system say that out of such a number there are of course only a very few who possess genius; but to this it may be replied that the great majority of the pupils are not only wasting their own time but that of the minority also, for the professor is bound to divide his attention amongst all his pupils, even though, if he be a man of any perceptive power, he must be aware that out of every ten in his class perhaps seven are totally unfitted to make musicians. This argument holds good against all institutions the aim of which is to force ability and manufacture genius; and the principle upon which it is founded is, that it is manifestly unjust both towards youths of ability and the public at large, to foster the unfounded aspirations of mediocrity by gratuitous, or even cheap, teaching where the promise of success is not tolerably certain. But there is another complaint which applies specially to the Conservatoire—the pupils are said to be deplorably ignorant. Formerly there was a rule that they "should have a certain knowledge of the principles of the French language," but it does not appear that any attention is paid to the general education of the pupils, who are said "to consist principally of the children of artisans, concierges, and small tradesmen, deeply imbued with a belief of their high calling, but supremely disdainful of the exigencies of grammar." This accusation may be somewhat overcharged, but there is little doubt that it is true in the main; nor is there any question that, while youths without mental cultivation may make excellent performers on the horn or trombone, the chance of their becoming true artistic musicians must be small indeed.

**RELIGIOUS MUSIC.**—The annual distribution of prizes at the school of religious music founded by M. Louis Niedermeyer also took place recently, under the presidency of M. Hamille, who represented the Minister of Justice and Religion. The distribution was preceded by a concert, performed by the pupils of the school, who gave two choruses of the fifteenth century and the Kyrie of the mass by the founder and director of the school. The prize pupils of the piano class performed Hummel's grand sonata, and that of Weber in C. The list of prizes and accessits awarded is a long one:—Three in musical composition, two in fugue, three in harmony, eleven in the organ class, five in chanting, fourteen in the piano class, and six in solfeggio. In this school the general education of the pupils is made a matter of special care; thus, there were bestowed one prize for religious instruction, five awards in the class of literary studies, and one prize for Latin. The jury consisted of MM. Félicien David, Foulon, Ermel, Saint-Saëns, Barbereau, Gewaërt, d'Ortigue, Maleden, Pacini, with the director and professors of the school. This establishment is not public or gratuitous in the general sense, but most, if not the whole, of the pupils are scholars presented by the archbishops and bishops, patrons of the school. There is another feature deserving of notice, namely, that the young men do not necessarily quit the establishment when they have obtained a prize, but remain to consolidate the knowledge and skill they have obtained in the classes; thus, the first prizeman of last year, although not competing, took part in the exhibition and received high complimentary mention.

### Manufactures.

**PETROLEUM STORES.**—A correspondent asks whether it would not be desirable, bearing in mind how largely property has been destroyed by fires which have origin-

ated at petroleum stores, owing to the ignited petroleum flowing down drains and waterways, thus carrying destruction with it to remote districts, that the Government should interfere and prevent the storage of large quantities in buildings which have connection with the drains, or are situated over the brinks of rivers or canals, and thus confine the risk, as much as possible, to the immediate spot on which the petroleum is stored?

**NEW MUSICAL INSTRUMENT.**—The *Musical Standard* says:—"We hear from Paris of a new musical instrument of striking power and sweetness, and at the same time extremely simple construction. It resembles a piano with upright strings, except that the strings are replaced by tuning-forks, which, to strengthen the sound, are arranged between two small tubes, one above and the other below them. The tuning-forks are sounded by hammers, and are brought to silence at the proper time by means of dampers. The sounds thus produced, which somewhat resemble those of the harmonium, are said to be extremely pure and penetrating. They are very persistent, yet instantly arrested by the use of the dampers."

**PAPER PULP** from the Esparto grass is now largely shipped from Carthage to Belgium and England. The export of esparto from Spain has increased five-fold of late years, and, with lead for ballast, British shipping have the advantage of making a profitable return freight. The import of esparto in 1865 into Great Britain was 51,522 tons, against 43,403 tons in the previous year; and the price to the papermakers is now greatly reduced. This year the imports have been still larger.

**TURKISH SILK MANUFACTURES.**—A silk-reeling factory has lately been established at Damascus, by a French merchant, which works well and is remunerative. Of looms for the manufacture of native silk stuffs, there were 3,436 in the year 1859, 700 in the year 1860, and only 550 in the year 1861; thus one of the effects of the sad events of 1860 was the destruction of nearly 3,000 looms, all of which belonged to Christians; but now these are being gradually re-established, and in 1864 there were 3,156 looms at work; more than 2,000 of them, however, are the property of Mohammedans. The following shows the number of pieces of silk stuffs produced at these looms:—In 1859, about 50,000 kerchiefs and inferior silks, and of the best kind 307,235; 1860, all included, 142,909; 1863, 1,500 cloaks, 50,000 kerchiefs, &c., 231,870; 1864, 1,500 cloaks, 50,000 kerchiefs, &c., 265,720; which shows that the native manufacture in this branch has nearly returned to its normal state.

**ADULTERATED SNUFF.**—In the manufacture of snuff known as "Irish" and "Welsh," the law permits the use of lime water; and some manufacturers have been in the habit of abusing this permission by using, not lime water alone, which is sufficient for the proper preparation of the snuff, but a thick mixture of that fluid and powdered lime, to an extent constituting an adulteration in its worst form, being physically injurious to the consumer, as well as a serious fraud on the Revenue. It is not easy to suppress this practice, from the fact that a certain but undefined amount of lime is necessary in the manufacture of the snuffs in question; it is consequently difficult to obtain a conviction upon an analysis of the finished article.

## Commerce.

**SUGAR IN MAURITIUS.**—Notwithstanding the very unfavourable weather, 121,000 tons of sugar were exported from Mauritius last season, and the next crop promises to be a good one; improvements in agriculture and machinery have been effected on a large scale; many estates which have suffered from want of proper husbandry have changed hands, and much capital is being expended upon them. The difficulties imposed by the differential sugar duties upon all sugar growers who are anxious to improve their manufacture have not been so

much felt in Mauritius, for although the fine sugar made there, and so much wanted here, is almost excluded from the English market by our fiscal arrangements, Australia and Bombay, where there are no shackles on intelligent manufacture, have as yet afforded a ready outlet for all the fine sugar made in Mauritius. Australia and Bombay together take nearly 50,000 tons, principally of crystallised vacuum pan sugar, and this gives some encouragement to those who have invested a large capital in improving manufacture. Of late the efforts of the planters to reduce the cost of the cultivation have been thwarted by the high price of rice, which is the principal food of the labouring classes, and is supplied to them in part payment of wages by their employers.

**SPANISH WINES.**—The common Spanish wines (*vins ordinaires*) are deplorably bad—far inferior to the common wines of France, Sicily, Italy, and Hungary, and even to the pleasant malvasia of Crete (the original *malvoisie*), which is sold in that island at about 4d. per bottle. It is surprising that when so much trouble is taken in preparing sherry for the foreign market, the Spaniard should be content with such inferior and ill-made wines as are found in the neighbourhood of really good vineyards. Very common bad wine is sold to the peasant at 10d. and even 1s. 2d. per bottle, but such wine is most unpalatable. The *vino-fino* costs about 2s. to 2s. 8d. per bottle, and very ordinary sherry is sold at the Seville and Cadiz hotels at 4s. and 4s. 6d. per bottle. It is always difficult for a traveller in Spain to find good wine; and even in the Cadiz district he is generally obliged to put up with what is very indifferent. In no wine-growing country of Europe is such bad and dear *vin ordinaire* to be found as in the south of Spain. It is, in fact, all dear; the *vino-fino* and the good class of sherry is dear and good; the rest is dear also, and bad. Many persons think that the cultivation of the grape will gradually increase in Spain, and occupy a larger breadth of land than at present. This will probably, in some degree, depend on the prices obtained abroad for the wine exported. Just at present, the price is becoming lower, owing to the large stock of sherry held in London. It is doubtful whether a much larger area of land in Andalusia will (for many years, at least) be used for vineyards, there is such a lack of population in Spain. Although the present good sherry wine of this district is the result of a combination of fine climate and suitable soil, with more than 100 years' experience in its manufacture and management, yet eventually many other parts of Europe will probably compete with Andalusia in producing a white wine, similar if not equal to ordinary sherry; and Hungary and Croatia will, in after years, when the careful management and manipulation of wine is better understood in those countries, be able largely to export a similar class of dry and wholesome wines, probably at a cheaper rate than Andalusia.

**THE BAMBOO AS A PAPER MATERIAL.**—The bamboo, which grows abundantly in most of the West India islands, has been for some time past largely exported from Jamaica to New York in bales and bundles for the purpose of being manufactured into paper, and has proved equally as valuable as rags. The value of the bamboos growing in Jamaica has been estimated as high as £150,000. The bulk of the article stood hitherto, however, in the way of shipment. Made up into bundles of large dimensions, the hold of a vessel was soon filled, and captains did not care to take it as freight, any vessels so laden becoming top-heavy. To prevent this, the vessel had first to be stored with heavy cargo on her ground tier, thus allowing less space for bamboo. To obviate this, efforts have lately been made with success in the island to crush the bamboo between the mill rollers, and, by screw pressing, pack it into bales, as is now done with esparto and other bulky fibres.

**PULPA OIL.**—Under this name, a considerable commerce is carried on in the Cape de Verd Islands, in the oil obtained from the seeds of the *Jatropha Curcas*, a

euphorbiaceous plant. The tree which bears this fruit reaches the height of about 15 feet, and grows wild without irrigation in sheltered places in the arid land of the islands of St. Jago, St. Nicholas, Fogo, and Bravo. About 350,000 bushels of the seed are gathered and exported annually to Portugal, where the oil extracted is called purqueira oil, and is used principally for burning. In British commerce it is usually known as seed oil. The plant is easily propagated, either by cuttings or seed.

**WINE.**—The quantity of wine imported in the first six months of this year was 8,493,240 gallons, as compared with 7,025,828 gallons in the corresponding period of 1865, and 8,264,211 gallons in the corresponding period of 1864. Of the total imports this year 3,995,451 gallons were red wine, as compared with 3,263,987 gallons and 3,070,108 gallons in the corresponding periods of 1865 and 1864. The imports of French wine appear to be steadily increasing, having amounted to 1,286,256 gallons of red wine and 528,987 gallons of white wine to June 30th this year, as compared with 943,811 gallons of red and 487,397 gallons of white wine to the corresponding date of 1865, and 907,320 gallons of red and 464,957 gallons of white wine to the corresponding date of 1864. The imports of wine have considerably increased this year from Portugal and Spain. The arrivals from British colonies, which were never very large, have, however, been further curtailed. Spain sent us to June 30th this year 669,244 gallons of red wine, and 3,190,710 gallons of white wine, the totals in the first half of 1865 being 492,888 gallons, and 2,475,773 gallons, and in the first half of 1864, 446,099 gallons and 4,073,545 gallons.

### Colonies.

**THE VINE IN NEW SOUTH WALES.**—The principal increase in the vine cultivation in this colony has been to the westward of the main range, and it is from that quarter, in the opinion of some competent judges, that, in future, chief supplies of the best wine are to be expected. The coast country is said to labour under two disadvantages; first, there is too little lime in the soil (a defect, however, which can be remedied by the application of bone dust or phospho-guano); secondly, there is too frequently rainy weather at the vintage. This latter is an objection that cannot be conquered, and it places the vine-growers completely at the mercy of the seasons. For making good wine it is desirable that the grapes should not be gathered till they are dead ripe; but if the vine-grower is in daily dread of heavy rain, he is tempted to pluck the fruit before it has attained a thorough maturity. The quantity of wine this year is said to be a little short, from the want of sufficient rain to swell the grapes, but the quality is excellent. So good a vintage season has not been known for several years.

**POSTAL ARRANGEMENTS IN VICTORIA.**—There are 525 post-offices in Victoria, being an increase of 200 in five years. The total number of letters received and despatched during 1862, amounted to 6,276,000; in 1865, 7,485,000. Newspapers, however, also show an increase of nearly 1,500,000 in three years. The number of packets despatched and received during 1865 amounted to 107,888. The increase is attributable to the more liberal regulation in regard to printed matter passing through the post. The epistolary correspondence of Victoria is much less per head than in England.

**QUEENSLAND COFFEE.**—At the local exhibition of articles to be forwarded from this colony to the Melbourne and Paris Exhibitions, a sample of coffee was exhibited of colonial growth, consisting of green berries, plump, of good size, and evidently sound quality, grown at the Brisbane Botanical Gardens; also a sample grown at Kangaroo Point.

**AUSTRALIAN DEFENCES.**—A proposal has been made public by the Australian agents for some iron works in Sweden to supply one or two more iron-clad turret

floating batteries of the class known as Ericsson's monitor, at a cost said to be quite within the means of the colonists; and the great interests that might be placed in jeopardy in the event of a war between the United Kingdom and a maritime power has caused this proposition to be submitted to public discussion. Whether such a means of defence would alone be sufficient—whether shore batteries would be preferable, or whether, as seems most probable, a combination of both would best meet the object in view, remain at present mere matters of opinion.

**QUEENSLAND COTTON.**—A Brisbane paper says:—"The first inspection of cotton made in Brisbane during this season was gone through at Raff's Wharf, by the Government inspector. The lot comprised 100 bales from Townsville, on the Logan River, and a small parcel ginned for smaller growers. The Townsville cotton, with the exception of three bales of Sea Island, was wholly of the New Orleans or short-staple variety. Its quality is unexceptionable, the fibre is sound, of good colour, and perfectly free from stains, while the ginning is all that can be desired. The estimated value of the cotton is 1s. 8d. per pound."

**CANTERBURY SHEEP.**—The total number of sheep in the province of Canterbury, on the 1st of January, 1866, was 1,735,416, against 1,433,644 on same date 1865, showing an increase of 301,772. It appears there are 35 stations in the northern district, with 354,405 sheep, and 87 in the central, with 651,947, and 50 in the southern, with 629,443 sheep.

**PUBLIC WORKS IN NEW SOUTH WALES.**—A sum of £10,000 having been voted by the Parliament for the improvement of the Rivers Murray, Murrumbidgee, and Darling, active measures have been taken for carrying out the work. Clearing parties have been formed for cutting away and removing the snags and other obstructions that impede the navigation of the rivers. An extensive scheme of improvement to Darling Harbour has been proposed by the Engineer-in-Chief for Harbours and Rivers, and submitted to the Government. It is proposed to construct a range of wharves to enclose the whole of the head of Darling Harbour, with a view to the establishment of a railway terminus there, and in connection with it to deepen the whole of that part of the harbour to twenty feet, so that vessels of the largest class may lie alongside the wharves to discharge or take in cargo. In the event of this scheme being carried out, many of the large London ships with goods for the country would doubtless discharge at one of these wharves, where they would be enabled to transfer cargo from their holds into railway trucks without any intermediate carriage; and they would also be in a position to take in, from the railway trucks, the produce of the country. It is the intention of the chiefs of the Works Department to have, if possible, all the more important public works in the colony photographed for the Paris Exhibition of 1867. This would undoubtedly be one of the most effectual means of exhibiting the importance of the colony, and the progress made within the last few years.

### Notes.

**LONDON STREET NAMES.**—A blue-book has been issued by the Metropolitan Board of Works, giving returns of the names of streets in the metropolis as regulated by the orders of the Board since 1856. These returns show that from 1857 to May in the present year, 46,879 houses were re-numbered, 2,110 subsidiary names of streets were abolished on re-naming or re-numbering the whole street, and 824 new streets have been approved from time to time under the Metropolitan Local Management Act.

**THE NEW ACT ON THE CARRIAGE AND DEPOSIT OF DANGEROUS GOODS.**—The new act to amend the law with respect to the carriage and deposit of dangerous goods has been published. Nitro-glycerine is declared to be specially dangerous, and other goods, by an order in council, may be deemed dangerous, and such goods

are to be specially marked, and a notice given of their character, and any person who commits a breach wilfully is to be liable to a penalty of £500, or two years' imprisonment. The term carrier is to include persons or bodies carrying goods or passengers by land or water.

AUSTRIA AND THE PARIS EXHIBITION OF 1867.—The *Mémorial Diplomatique* says:—"We regret to announce, on the authority of letters from Vienna, that the participation of Austria in the Paris Universal Exhibition of next year is very doubtful. The principal manufactories of that empire are carried on in Bohemia and Moravia, and those provinces have been literally ravaged by the Prussian occupation. A large number of objects intended for the Exhibition of Paris have been carried off by the Prussians; and, on the other hand, the exactions and contributions of all kinds imposed on the populations prevent the manufacturers of those districts from making any sacrifices to appear with honour in the general competition of 1867. Rather than be seen in a situation of undoubted inferiority, the Austrian manufacturers prefer to abstain from taking part in the Paris Exhibition, with the intention of reserving their efforts for that which is proposed to take place at Vienna in 1870."

OXYGEN EXTRACTED FROM THE AIR.—Mons. Tessié du Mothay has invented a process for obtaining a supply of oxygen from the atmosphere, which he proposes to show in operation in the Exhibition of 1867. The process is stated to be extremely cheap, and adapted to the production of gas on a large scale. Permanganate of soda is the agent employed. A solution of this salt is placed, under proper conditions and at a suitable temperature, to be traversed by a current of air, by means of which the oxygen of the air is seized upon by the solution, and the nitrogen is set free. When sufficiently saturated with oxygen, the current of air is replaced by a current of steam, which, without decomposition, drives off the oxygen almost absolutely pure. The permanganate solution, which by the condensed steam has become diluted, is then concentrated by the addition of fresh salt, and the operation repeated.

DEMOLITIONS IN PARIS.—The Hôtel Laffitte and twenty other houses are about to be demolished in order to extend the Rue Lafayette to the new Opera House now in course of erection, and the sums allowed to the proprietors by the juries amount to more than £548,000. The Hôtel Laffitte is almost historical; it was the property of the famous banker of that name, and in the grand *salon* was composed the Constitution of 1830. M. Laffitte was ruined by the revolution, and his hôtel put up to sale by auction, when it was purchased by the nation and presented to its late proprietor as a token of national gratitude for his efforts in the cause of liberty; a marble tablet, recording the fact, formerly affixed to the front of the house, may now be seen in the courtyard. It was afterwards inhabited by the family of Marshal Ney. The sum paid for this property was £92,000; in other cases the award was equal to £88,000, £64,000, and £44,000; the occupiers of these various houses received by way of compensation for removal in three cases, £8,000; in others, £4,600, £3,200, £2,200, £2,000, down to £200.

## PARLIAMENTARY REPORTS.

### SESSIONAL PRINTED PAPERS.

*Delivered on 7th August, 1866.*

- |               |   |
|---------------|---|
| Par.<br>Numb. |   |
| 425.          | Chain Cables and Anchors—Further Correspondence.          |
| 439.          | Foreshores (Scotland)—Correspondence.                     |
| 455.          | Schoolmasters (Ireland)—Return.                           |
| 463.          | Scottish Records—Letter.                                  |
| 464.          | Private Bills (Referees)—Return.                          |
| 472.          | Militia (Ireland)—Return.                                 |
| 478.          | Labouring Classes Dwelling Houses Act (1866)—Rules, &c.   |
|               | <i>Delivered on 8th August, 1866.</i>                     |
| 293.          | Coinage—Report by Mr. H. W. Chisholm.                     |
| 449.          | Master and Servant—Report.                                |
| 450.          | Caledonian Canal—Sixty-first Report of the Commissioners. |

*Delivered on 9th August, 1866.*

381. Steam Vessels—Return.  
470. Cattle Diseases (Ireland) Act—Order in Council.  
473. Cattle Plague—Five Orders in Council.  
Vagrancy—Reports by Poor-law Inspectors.  
Workhouse Dietaries—Report by Dr. Edward Smith.  
Foreign Countries—Statistical Tables, Part 10.

*Delivered on 10th August, 1866.*

355. Industrial and Provident Societies—Return.  
457. Navy Contracts—Return.  
Ecclesiastical Corporations in Italy—Correspondence respecting the Suppression.

## Patents.

*From Commissioners of Patents' Journal, August 10th.*

### GRANTS OF PROVISIONAL PROTECTION.

- Anchors—1949—J. C. Haddan.  
Bedsteads, fastening for—1973—W. E. Gedge.  
Electric telegraph apparatus—1867—C. and S. A. Varley.  
Files, cutting—1987—J. Talabot.  
Fire-arms, revolver—1959—J. Adams.  
Furnaces, combustion of fuel in—1955—W. E. Newton.  
Hoops, metallic—1975—J. Pool.  
Lamps—1744—J. Jackson.  
Paper bags—1965—T. and J. Bibby.  
Railways, permanent way of—1951—W. Seaton.  
Railway signals—1963—J. McKenzie, T. Clunes, and W. Holland.  
Safes—1977—E. I. Billing.  
Saws, apparatus for sharpening—1943—E. H. Bentall.  
Sewing machines—1947—J. P. Hubbard and C. Adams.  
Shuttles—1967—T. Bullough and G. Openshaw.  
Steam boilers, regulating water-supply—1955—C. D. Abel.  
Steam generators—1941—H. A. Bonneville.  
Tenoning machines—1983—G. H. Couch.  
Traction engines—1957—J. P. Smith.  
Weaving, ornamental—1953—J. Orr.

### INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

- Horse-shoes—1999—H. J. Batchelder.  
Horse road scraper—2020—W. Smith.

### PATENTS SEALED.

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|------------------------------|--|
| 434. C. D. Abel.             | 476. E. T. Hughes.                         |
| 439. F. F. Warren.           | 477. J. Rothery.                           |
| 445. W. Young.               | 490. E. Drevelton.                         |
| 452. W. Brown and C. N. May. | 504. J. Fletcher.                          |
| 455. J. Vero.                | 506. J. Wolstenholme and J. T. Fendlebury. |
| 462. S. Mason.               | 552. J. C. and H. G. Haddan.               |
| 465. J. Holding and P. Todd. | 592. W. Clark.                             |
| 468. J. Barlow.              | 728. W. E. Newton.                         |
| 470. R. B. Pilliner.         | 1552. H. J. Griswold.                      |
| 475. W. N. Wilson.           |  |

*From Commissioners of Patents' Journal, August 14th.*

### PATENTS SEALED.

- |                                 |                           |
|---------------------------------|---------------------------|
| 478. J. Young.                  | 518. E. M. du Boys.       |
| 479. T. Adams and G. J. Parson. | 521. A. Moore.            |
| 485. G. Bedson.                 | 550. C. de Caesaris.      |
| 495. J. Paterson.               | 568. G. E. Donisthorpe.   |
| 496. P. E. Placet.              | 570. C. Mather.           |
| 498. E. J. C. Welch.            | 589. C. E. Treadwin.      |
| 507. S. Nelson.                 | 667. J. Gray.             |
| 508. H. Willis and G. Rice.     | 861. W. L. and T. Winans. |
| 513. J. Kidd.                   | 921. J. Davis.            |
| 516. P. Smith.                  | 1141. F. Barnett.         |

### PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

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|------------------------|----------------------------------|
| 1944. G. E. Charageat. | 1966. J. W. Armstrong.           |
| 1970. R. Dickson.      | 1978. J. T. King.                |
| 1977. D. W. Barker.    | 1988. J. Cornforth & A. Andrews. |
| 1998. C. C. Dennett.   | 1995. R. S. Newall.              |
| 1964. H. R. Brown.     | 2036. J. Smith.                  |

### PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

- |                  |                  |
|------------------|------------------|
| 1836. J. Cannon. | 1878. C. Mather. |
| 1849. W. Muir.   |                  |

## Registered Designs.

- Part of a Pencil Case—July 19th—4800—J. Munro and D. Haslett, 42, John-street, Fitzroy-square, W.  
Table Catch—August 6th—4801—T. Atkins and Son, Bartholomew-row, Birmingham.  
Stalking Coat—August 8th—4802—T. J. Dobson, 33, Burlington-road, St. Stephen's-square, W.  
Bottle Holder—4803—C. J. Mejeran, 33, Oriental-place, Brighton.